EVALUATION OF PARTIAL ANOMALOUS PULMONARY VENOUS CONNECTION BY COMPUTED TOMOGRAPHY ANGIOGRAPHY. A RETROSPECTIVE CROSS SECTIONAL STUDY AT A TERTIARY CARE HOSPITAL

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ABSTRACT

Objective: To describe the pattern of patients presenting with partial anomalous pulmonary venous connection at a tertiary care hospital.

Methodology: A retrospective cross-sectional study was conducted from January 2018 to June 2019 at pediatric cardiology clinic of Hayatabad Medical Complex Peshawar. Computed tomography angiography (CTA) by retrieving the results of partial anomalous pulmonary venous connection (PAPVC). All CTAs were taken with the help of Toshiba 64 aquiloin machine and reviewed by pediatric cardiologist. Overall, data was summarized using tables and graphs.

Results: Total of 32 patients were enrolled in the study. Age range from <1 year to 55 years with mean age of 9.2 (13.9 SD). Males were 19 (59%) while females were 13 (41%). Right atrium is the commonest site of PAPVC which was observed in 12 patient (37%) followed by left Innominate vein in 6(19%). Anomalous pulmonary venous connection of single vein was observed in 12 cases (39%), followed by two veins in 10 (32%). Atrial septal defect (ASD) is the commonest associated lesion seen in 24 cases (75%) followed by ventricular septal defect in 4 (12%).

Conclusions: Pre-operative evaluation of PAPVC by CTA can provide accurate anatomical details. Right atrium is the commonest site of PAPVC followed by left Innominate vein. ASD is the commonest associated lesion followed by VSD.

Key Words: Partial anomalous pulmonary venous connection, Computed tomographic angiography, Superior vena cava, Inferior vena cava, Atrial septal defect, Ventricular septal defect

INTRODUCTION

Fragmentary sporadic aspiratory venous affiliation (PAPVC) is an intrinsic heart deformation where in any event one, yet not all, pneumonic veins channel into a central vein or right atrium[1]. The prevalence of PAPVC is about 0.4-0.7%[2].

During the underlying two months of fetal unforeseen development, the venous blood from the aspiratory vascular bed channels into central veins. By then customary aspiratory vein rises out of left chamber and creates toward the lungs. It develops a relationship with pneumonic vascular bed. This is followed by disappearing of rough relationship with central veins. PAPVC arises when there is disillusionment of at any rate one of pneumonic veins with the ordinary aspiratory vein and nonappearance of backslide of rough lung leakage to key vein[3].

PAPVCs show a wide anatomic reach. Essentially every conceivable relationship between the pneumonic veins, from one perspective, and the distinctive basic venous feeders, on the other hand, has been reported[4]. Right-sided unusual aspiratory veins can interface with dominating vena cava (SVC), right chamber, inferior vena cava (IVC), azygous vein, hepatic vein or entryway vein. Left – sided atypical pneumonic veins can connect with left Innominate vein, coronary sinus or hemiazygous vein[5].

PAPVCs are left to right shunts. The volume of left to shunt depends upon the amount of odd pneumonic veins. Clinical appearances endless supply of PAPVC similarly as related cardiovascular defects. Dyspnea, straightforward exhaustion limit, practice bias, palpitations, right cardiovascular breakdown, and aspiratory hypertension can happen[6,7].

PAPVC is regularly investigated by echocardiography. Cardiovascular catheterizations and angiographies are habitually performed for insistence. Echocardiography gives lacking information as a result of its little field of vision, insufficient objective to recognize indi-

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vidual pneumonic veins, and the difficulty of perceiving drainage site[8,9]. Heart catheterization and angiography remains the standard definite instrument. It is a director subordinate procedure with basic peril related with prominent method. Pictures got during late stage will in all probability be not able to show the affiliation site convincingly[9,10].

Multidetector-section enlisted tomography (MDCT) angiography could give more exact morphology. It is non prominent and give snappy picture acquiring high spatial and transient objective with redesigned contrast bolus timing. The amount of odd aspiratory veins, its waste site and related cardiovascular disfigurements can be viably and reliably recognized by MDCT angiography[11-15].

It is basic to make a privilege pre-employable assurance of PAPVC preceding implying a patient for heart operation. This will impact the cautious technique and following organization. This assessment was planned to choose morphologic characteristics among patients giving PAPVC from January 2018 through June 2019 in pediatric cardiology unit of an educating center

METHODOLOGY

A retrospective cross-sectional study was conducted from January 2018 to June 2019 by retrieving the results of Computed tomography angiography (CTA) of patients with PAPVC attending pediatric cardiology clinic of Hayatabad Medical Complex, Peshawar. All the CT angiograms were taken with the help of Toshiba 64 aquilion machine and reviewed by pediatric cardiologist. Overall, data was summarized using tables and graphs.

RESULTS

Total of 32 patients was included in the study. Age ranged from 2 months (0.2 years) to 55 years with a mean age of 9.2 (13.9 SD). Males were 19 (59%) while females were 13 (41%). Right atrium is the commonest site of PAPVC that was observed in 12 cases (37%) followed by left Innominate vein in 6(19%), SVC-RA junction in 4(12.5%) and IVC in 4 (12.5%). Anomalous pulmonary venous connection of single vein was observed in 12 cases (39%), followed by two veins in 10 (32%) and three veins in 9 (29%). Atrial septal defect (ASD) is the commonest associated lesion seen in 24 cases (75%) followed by ventricular septal defect in 4 (12%). Majority of cases had right heart dilatation, which was observed in 28 (87%). Only one case had right ventricular outflow obstruction (3%). Majority had left aortic arch 32 (97%) while right aortic arch was present in 1 (3%). Collateral supply to a lobe of lung from descending aorta was observed in 3 cases (9%). These three cases were PAPVC to IVC (Scimitar syndrome).

Table 1: Pattern of Partial Anomalous Pulmonary Venous Connection by Computed Tomography Angiography (n=32)

Variable	Freq.	Percent
Site of drainage		
Coronary sinus	1	3.13
IVC	4	12.5
Left Innominate vein	6	18.75
Right atrium	12	37.5
Right atrium close to IVC entry	1	3.13
Right atrium & left Innominate	1	3.13
SVC	2	6.25
SVC & right atrium junction	4	12.5
SVC & right atrium	1	3.13
Number of anomalous veins		
One	12	38.71
Two	10	32.26
Three	9	29.03
ASD		
No	8	25
Yes	24	75
VSD		
No	28	87.5
Yes	4	12.5
Right heart dilatation		
No	4	12.5
Yes	28	87.5
RVOT obstruction		
No	31	96.88
Yes	1	3.13
Aortic arch		
Left	31	96.88
Right	1	3.13
Number of collateral arteries from aorta supplying lung		
0	29	90.63
1	1	3.13
2	2	6.25

DISCUSSION

PAPVC is a rare congenital anomaly in which one or more (but not all) of the pulmonary veins drain to the right atrium, directly or through one of its tributary veins.

PAPVC may be suspected at Echocardiography; however, the lack of adequate acoustic windows makes it difficult to detect through this diagnostic modality[3].

Evaluation of PAPVC by MDCT has gained im-

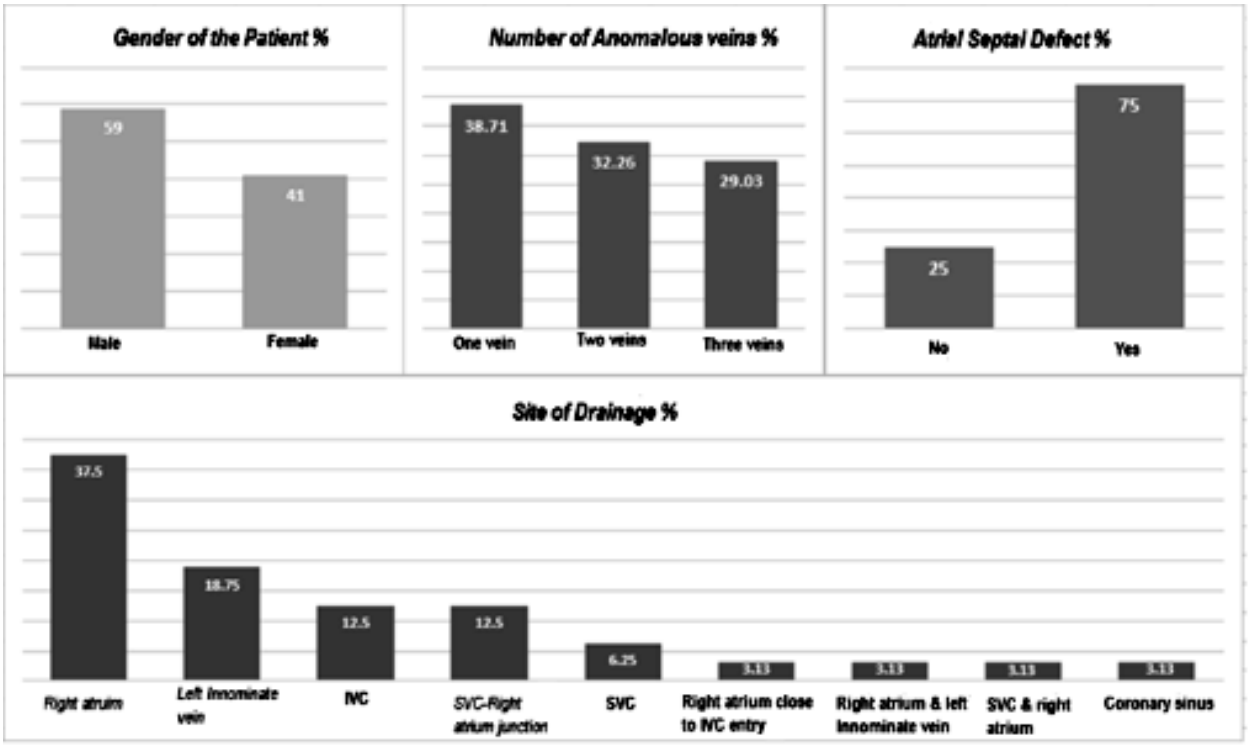

Figure 1: Characteristics of the patients presented with Partial Anomalous Pulmonary Venous Connection by Computed Tomography Angiography (n=32)

portance as a non-invasive diagnostic modality[3,16] . In our patients, contrast enhanced MDCT was used. Multi-planer and volume rendered reconstructed images provided precise diagnosis. Pre-operative information obtained with the help of MDCT regarding the number of anomalous veins; its site of drainage and associated cardiac defects is useful for surgical planning and preventing surgical complications.

Many authors report that right side PAPVC is twice as common as left side. However, other studies report that left sided PAPVC may often be found in adult patients; instead right-sided PAPVC is more common in children[17]. In our study 24 cases (75%) out of 32 had anomalous connection to right side of heart. In only 7 cases (22%) there is anomalous connection to left side veins i.e. left Innominate vein and coronary sinus. In only one case there was a dual connection to right atrium and left Innominate vein. Out of 32 cases, only 5 (15%) were adults. Among adult cases, in 4 (80%) the anomalous drainage was towards right side. In only one case (20%), it was to left Innominate vein.

Patients with PAPVC are usually asymptomatic or may present with heart murmurs, recurrent chest infections, dyspnea, failure to thrive, fatigue and arrhythmias. Some authors suggest that PAPVC may be clinically significant when 50% or more of pulmonary blood drains to systemic circulation, resulting in significant left to right shunt[2,3]. This left to right shunt leads to right heart dilatation, severe tricuspid regurgitation and right atrial arrhythmias that may lead to sudden cardiac decompensation. Progressive re-modeling of pulmonary circulation occurs with increased left to right shunt. This leads to increased pulmonary vascular resistance and development of pulmonary hypertension. Therefore, the early imaging recognition of PAPVC is important in preventing pulmonary hypertension and its consequences [18]. In our study significant right heart dilatation was observed in majority of the cases i.e., 28 (87%). The commonest associated lesion with PAPVC in our study was ASD. It occurred in 75% of cases. High percentage of association has been reported in literature [3,7,8,10].

CONCLUSION

Evaluation of PAPVC by CTA can provide accurate non-invasive assessment of anatomy. In helps pediatric cardiologist in decision-making. When it comes to surgical planning, surgeons prefer high resolution MDCT angiography, since it offers a superior spatial resolution with clear morphology.

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